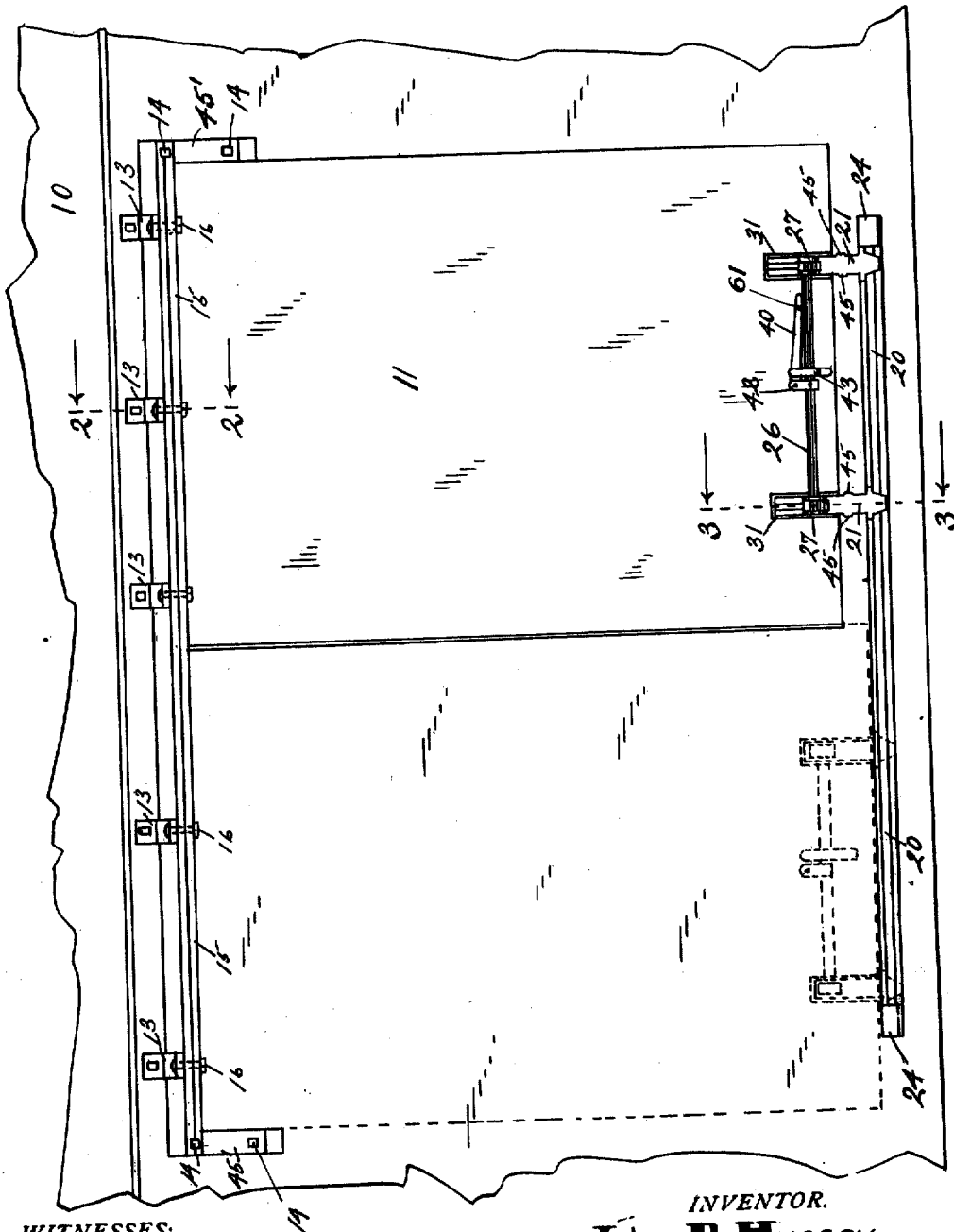


1,015,025.

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SLIDING-DOOR CONSTRUCTION.

1,015,025.

Specification of Letters Patent.

Patented Jan. 16, 1912.

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To all whom it may concern:

Be it known that I, JOHN R. HUSSEY, of Indianapolis, county of Marion, and State of Indiana, have invented a certain new and useful Sliding-Door Construction; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings.

The object of this invention is to simplify, cheapen and improve the operation of sliding door constructions for railway cars and other structures. In this construction means is connected with only the lower portion of the door for lowering the door in its opening movement and elevating the door in its closing movement. The top of the door is free and independent of all other parts and also of guiding and holding means. A hood is secured in front of the upper part of the door opening, which is downwardly and outwardly inclined, for holding the top of the door closed and limiting its outward movement, and, therefore, in both conditions resisting outward strain, and for guiding the top of the door inwardly to its seat when the door is elevated. Means are also provided for locking the door at the bottom, said locking means being controlled by the door operating means so that a single means opens and closes the door and locks and unlocks the same.

The nature of the invention will be understood from the accompanying drawings and the following description and claims:

In the drawings Figure 1 is a front elevation of a portion of the structure with said sliding door construction, with the door shown closed by full lines and in its open position by dotted lines. Fig. 2 is a vertical section on the line 2—2 of Fig. 1 through the upper portion of the door and adjacent parts and showing the door in the closed position. Fig. 3 is a vertical section on the line 3—3 of Fig. 1 showing the lower part of the door and adjacent parts below the same, with the door in closed position. Fig. 4 is a section on the line 2—2 of Fig. 1 showing the door in open position by full lines and in a position during the opening movement by dotted lines. Fig. 5 is a section on the line 3—3 of Fig. 1 showing the door in open position by full lines and in a position

during the opening movement by dotted lines. Fig. 6 is a front elevation of one set of irons or metal parts for vertically manipulating the door, the shaft being partially broken away. Fig. 7 is a transverse section on the line 7—7 of Fig. 6. Fig. 8 is a section on the line 8—8 of Fig. 6. Fig. 9 is a section on the line 9—9 of Fig. 6. Fig. 10 is a side elevation of the lower part of a frame and a portion of a standard in the frame viewed from the line 10—10 of Fig. 6. Fig. 11 is a front elevation of the central portion of the shaft and means for actuating the same, the parts being shown in the position occupied when the door is closed. Fig. 12 is a section on the line 12—12 of Fig. 11. Fig. 13 is a section on the line 13—13 of Fig. 11. Fig. 14 is a plan view of the locking plate on the floor beneath the door. Fig. 15 is a section on the line 15—15 of Fig. 14. Fig. 16 is the same as Fig. 15 with the rack bar from the door in locking position.

There is illustrated herein a structure 10, such as a railway car, having the usual door opening in the side adapted to be closed by the sliding door 11, which fits into the opening so as to be flush with the side of the structure. The door opening is slightly higher and wider than the door when closed. In front of the upper part of the door opening a downwardly and outwardly inclined hood is secured in place. It consists of a strip 12 secured to the bracket 13 and the block 45 fastened to the structure by the bolts 14, and a guide bar 15 is secured on the lower edge by bolts 16 and to the block 45 by bolts 14. The upper inner edge of said strip 12 extends perpendicularly below the top of the door opening and therefore holds the top of the door in its closed position. This hood serves as a rain guard, also as a deflecting plate for guiding the top of the door while being closed by the upward movement of the door, and also resists outward pressure from within against the door, both when the door is closed and when open, and serves as a guard for the top of the door when moved laterally.

A rail or track 20 is secured to the structure below the door opening by bolts 221. The form of this track is preferably that of a railway rail turned with the web in a hori-

zontal position instead of vertical, and there is a pair of standards 21 supported by and slidable along the head of said rail, which constitutes the track. The standards 21 have lower in-turned flanges 22 and oppositely disposed in-turned upper flanges 23, which embrace the track, so that the standards cannot directly escape therefrom laterally or vertically, and the stops 24 on the ends of the track, see Fig. 1, prevent the escape of the standard 21 at the ends of the track as the lugs 121 on the standards come in contact with said stops.

Preferably two of the standards 21 are arranged on opposite sides of the vertical center of the door, as shown in Fig. 1, and at their upper ends carry forwardly projecting ears 25, see Fig. 6, in which segmental pinions 27 are mounted on a hexagonal shaft 26, which extends between said standards. These pinions mesh with a rack bar 30, which is vertically slidable in a frame 31. The frame 31 is embedded in the correspondingly shaped recess in the outer surface of the door 11 and held in place at its upper end by the flanges 32 which project laterally into the door, and by rearward and up-turned flanges 132, at the lower ends, which project under and behind the door, see Figs. 3 and 10. In the front wall of said frame 31 there is a vertical slot or opening 33, into which the standard 21 projects, and the upper end of the standard 21 is held in said frame and guided by the laterally extending lugs 34 engaging the grooves in said frame, see Fig. 7. In the rear wall of the frame 31 there is likewise a slot for the rack bar 30. The rear wall of the rack bar is contracted, as shown in Fig. 7, to fit in the slot of the frame 31, so that the rack bar is guided by said frame, and also, the frame furnishes bearing or backing for the rack bar. The rack bars are held by the pinions 27, which engage the rack bars between their ends, and the upper end is adapted at one time of the operation to engage the top plate of the frame 31. The lower ends of the rack bars are adapted to enter a hole 36 in the locking plate 37, which is secured to the floor 38 of the car, see Figs. 3, 5, 14, 15 and 16. On each side of the standards 21 a two-faced flange 45 is secured, having a vertical lower portion near the outer surface of the standard and an upper portion which extends rearwardly and at a slight angle from a horizontal line, see Fig. 10. This is for the purpose of guiding the front wall of the lower end of the frame as the latter moves down over the standard, as will hereafter appear.

Stop blocks or bumpers 45', which are parts of the hood, are secured thereto and to the structure at the ends of the hood so as to stop the upper part of the door in each direction at the same time that the blocks

24 stop the standards 21 at the lower part of the door, these blocks together acting as bumpers for the door.

The shaft 26 is operated by a handle 40, which is pivoted at 41 between the flanges of the handle holder 42 driven or shrunk on to the shaft 26 about midway, the connection between the handle holder 42 and the handle 40 being such as to enable the handle, when at a right-angle with the shaft 26, to give said shaft a partial revolution and thus actuate the pinions 27. These parts are arranged so that when the door is closed, the handle 40 can be folded down on the shaft in the position shown in Fig. 11, and it is held in that position by a catch bar 43, which is secured to the door and preferably extends up in front of the shaft 26 and handle bar 40 and prevents any rotary movement thereof until the handle bar 40 is turned from a horizontal position to a vertical position, as indicated by dotted lines in Fig. 11.

The door is sealed by the seal 60 inserted through a hole 61 in the handle bar 40 and extended around the shaft 26 so as to prevent the handle being lifted up into actuating position.

The operation will now be explained: Assuming the door to be closed, as shown in Figs. 2 and 3, the handle 40 is lifted from the horizontal to the vertical position, as shown in Fig. 11, and then pulled outwardly away from the door so as to give the shaft 26 an oscillatory movement, whereby the pinions 27 lift the rack bars up out of the locking plates, unlocking the door, and then on upwardly until they engage the top of the frame and raise the door from the position shown in Figs. 2 and 3 to that shown by dotted lines in Figs. 4 and 5 clearing the car floor and resting on the standards. Then the bottom of the door is pulled outwardly on the standards until said standards are in line with the frame and form an absolute stop against further outward movement. The handle 40 then is substantially in the dotted line position shown in Fig. 5, that is, it extends downwardly at a slight angle to a vertical position. Then the outer end of the handle is moved upwardly, which permits the door to settle into the full line position shown in Figs. 4 and 5. In the first of these two movements the lower front wall of the frame is moved outwardly along with the door from the position shown in Fig. 3 to that shown in Fig. 10, and then during the latter of the above movements, while the door is moving to the full line position shown in Figs. 4 and 5, the front walls of the frame move downwardly in front of the cam lugs 45, until the frames eventually engage and rest upon the lateral or backward lugs 121, or both, on the standards. Therefore, the lugs 121 support the door in its out-

ward position upon the standards 21, which travel on the track and support the door. While in this outward position, the top of the door is in the position shown in Fig. 4 by full lines, that is, it is considerably below the part 12 of the hood and travels loosely between the guide 15 and the side of the car or structure. While in this condition the handle 40 is in its locked position, as shown in Fig. 11, that is, in the same position as when the door is closed and with the ratchet bars engaging the top of the frame.

The door is closed by reversing the operation above outlined. The handle 40 is turned up and then outwardly and downwardly, and that will move the door from the position shown in Figs. 4 and 5 upwardly. When the upper end of the door engages part of the hood 12, the latter's inclination is to shove the door inwardly toward the car or door opening and guide the further upward movement of the door until it reaches the dotted line position shown in Fig. 4. The direct vertical movement of the lower part of the door continues until the casing 31 is lifted from the stop lugs 121 up above the cam lugs 45, as shown in Fig. 10. Then the door falls or is pushed rearwardly into the dotted line position shown in Figs. 4 and 5. The lever 40 is then turned up to its idle position again, whereupon the door settles on its seat on the floor of the structure and leaves the ratchet bars free of the door, and they are forced on down to interlock with the plates 38.

In this construction it is observed that the upper end has no means thereon for holding or guiding the same, but it is held and guided wholly by the hood, which is connected with the structure. When closed there is a clearance between the top of the door and the bottom of the side plate of the structure, but this clearance is always less than the engagement of the rack bars in the locking plates 38, so the door cannot be released from a locked position until the rack bars are moved upwardly. The bars 30 are movable only by the pinions 27 and the handle 40. Hence the door cannot be unlocked at the bottom as long as the lever 40 is sealed, that is, neither by the jostling of the door while the train is under way, nor by the efforts of a person attempting to enter the car without unsealing the same. Likewise, the door is locked at its lower end when in its outer position by the cam lugs 45 engaging the front walls of the frames 31. The pinions 27 and associated means not only raise and lower the door, but cause it to be locked in both the closed and open positions. The frames are secured to the door without nails, screws, rivets or bolts, but by means of lugs and the like inserted or built in the door. Thus the frames are held in place by the lugs or plates 32 and

132, or the like, which prevent movement in any direction by said frames independently of the door. Direct connections between the door and the lower part of the standards 21 are dispensed with. The upper end of the door is held from outward movement when seated by the inclined strip 12. The handle 40 is always out of the way when the door is either opened or closed, and the parts on the door are held from movement while in both of said positions. The door is wholly operated and manipulated from its lower end only and by the extremely simple arrangement, as indicated by full lines in Fig. 1.

It is to be observed also that the door operating means not only opens and closes the door, but likewise locks and unlocks it. The door operating means raises the door from its seat on the floor of the structure when closed on to the standards forming a part of the door operating means, so that when not seated the door is supported wholly by the standards. This is true whether the door is in its open position or is being opened or closed. After being elevated slightly from the closed position so as to clear the floor, the door is drawn outwardly at the lower end and lowered to the open position. In the open position the weight of the door is supported wholly by the flanges 121 and the standards, and the shaft 26, lever 40 and associated parts are otherwise idle. The hinged lever 40 not only is a part of the operating means but also is the means which is secured for sealing and locking the operating means from use and that without any additional attachments to the car or structure, but merely the use of the usual seal. The frames 31 wholly receive the standards 21 when the door is in the outer position, and, therefore, the standards tend to serve as buffers or means for limiting the outward movement of the lower portion of the door while the same is being opened. The two-faced flanges 45 on the standards tend to steady the door in its movements and keep the same in line with the standards and away from the face of the structure until the door is high enough, during the closing movement, to move rearwardly into closing position. Hence these flanges 45 are nearly as high as the bottom of the door opening.

I claim as my invention:

1. The combination with a structure having a door opening, and a separate door for closing the opening, of means for operating the door which includes movable bars, and means in connection with the structure which said bars engage as the door is closed and disengage as the door is opened for locking and unlocking the door.

2. The combination of a structure having a door opening provided with recesses in the lower surface of said opening, a separate

door for closing said opening, and means mounted in connection with the lower portion of the door for operating the door which includes vertically movable bars adapted to enter said recesses for locking and unlocking the door.

3. The combination of a structure having a door opening provided with recesses in the lower surface of said opening, a separate door for closing said opening, means mounted in connection with the lower portion of the door for supporting the door, and means for operating the door which includes bars vertically movable independently of the door and adapted to enter said recesses when the door is closed.

4. The combination with a structure having a door opening, and a separate door for closing said opening, of a track on the structure below the door opening, standards on said track provided with lugs on which the bottom of the door rests while in the outer position and whereby the door is supported while in said position, and means mounted in connection with said standards for lowering the door upon said lugs while opening the door and for elevating said door from said lugs to the door opening for closing the door.

5. The combination with a structure having a door opening, and a separate door for closing said opening, of a track on the structure below the door opening, standards on said track provided with lugs near their lower ends, frames secured to the door into which the upper ends of said standards extend and whereby the lower portion of the door is guided in its vertical movements and which telescope with said standards and rest upon said lugs when the door is in its open position, and means mounted in connection with said standards for giving the door its vertical movements.

6. The combination with a structure having a door opening, and a separate door for closing said opening, of a track on the structure below the door opening, standards on said track provided with side lugs about midway of the ends of said standards, frames secured to the door into which the upper ends of said standards extend and whereby the lower portion of the door is guided in its vertical movements and provided with front flanges adapted to overlap the lugs on said standards after the door is moved to its outer position and lowered, and means mounted in connection with said standards for giving the door its vertical movements, whereby the lower portion of the door will be guided in its vertical movements while in the outer position and will be held in connection with said standards and clear of the structure until again lifted above said lugs.

7. The combination with a structure hav-

ing a door opening, and a separate door for closing said opening, of a track on the structure below the door opening, standards on said track provided with door supporting lugs near their lower ends and with side lugs about midway of the ends of said standards, frames secured to the door into which the ends of said standards extend and whereby the lower portion of the door is guided in its vertical movements and provided with front flanges adapted to overlap the side lugs on said standards after the door is moved to its outer position and while being lowered upon said door supporting lugs and elevated therefrom, and means mounted in connection with said standards for giving the door its vertical movements.

8. The combination with a structure having a door opening, and a separate door for closing said opening, of means for operating the door including an actuating shaft mounted horizontally in said door, a lever pivoted to said shaft so that the lever can turn the shaft when at a right-angle therewith and when not in use can be turned to a horizontal position parallel with the shaft, means secured to the door for locking said shaft and lever against operation unless the lever is lifted out of engagement with said locking means, and a seal for sealing said lever in connection with said shaft, whereby said shaft cannot be operated without breaking the seal.

9. The combination with a structure having a door opening, and a separate door for closing said opening, of a track on the structure below the door opening, standards on said track, frames embedded in said door into which the upper ends of said standards project and whereby said frames are guided in the vertical movements of the door, a shaft mounted on the upper ends of said standards, pinions secured on said shaft which project into said frames, and vertical rack bars loosely mounted in said frames and operated by said pinions and arranged so that when moved upwardly they will engage the top of said frame and lift the door for opening, supporting and closing the same and when the door is seated they may be moved downwardly independently of the door for locking the lower end thereof.

10. The combination with a structure having a door opening, and a separate door for closing said opening, of a track on the structure below the door opening, standards on said track, frames embedded in said door into which the upper ends of said standards project and whereby said frames are guided in the vertical movements of the door, a shaft mounted on the upper ends of said standards, pinions secured on said shaft which project into said frames, vertical rack bars loosely mounted in said frames and operated by said pinions and arranged so

that when moved upwardly they will engage the top of said frame and lift the door for opening, supporting and closing the same and when the door is seated they may
5 be moved downwardly independently of the door for locking the lower end thereof, a lever for operating said shaft, and means for sealing said lever.

In witness whereof, I have hereunto affixed my signature in the presence of the witnesses herein named. 10

JOHN R. HUSSEY.

Witnesses:

G. H. BOINK,
H. J. WELLS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."